

AN EFFECTIVENESS TRIAL OF CONTINGENCY MANAGEMENT IN A FELONY PREADJUDICAMENT DRUG COURT

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This study evaluated a contingency management (CM) program in a drug court. Gift certificates for compliance were delivered at 4- to 6-week intervals (total value = \$390.00). Participants in one condition earned gift certificates that escalated by \$5.00 increments. Participants in a second condition began earning higher magnitude gift certificates, and the density of reinforcement was gradually decreased. No main effects of CM were detected, which appears to be attributable to a ceiling effect from the intensive contingencies already delivered in the drug court and the low density of reinforcement. Preplanned interaction analyses suggested that participants with more serious criminal backgrounds might have performed better in the CM conditions. This suggests that CM programs may be best suited for more incorrigible drug offenders.

DESCRIPTORS: drug abuse, drug court, contingency management, criminal justice, operant conditioning

Drug courts are special criminal court dockets that provide a judicially supervised regimen of drug abuse treatment and other needed services for nonviolent drug-abusing offenders in lieu of criminal prosecution or incarceration. The key components of a drug court include (a) ongoing status hearings in

court for the judge to review clients' progress, (b) mandatory completion of drug abuse treatment and indicated adjunctive services, (c) random weekly urine drug screens, (d) punishers for program infractions, and (e) reinforcers for program achievements (National Association of Drug Court Professionals [NADCP], 1997). The punishers and reinforcers are typically arranged on an escalating gradient, in which the magnitude increases progressively in response to successive infractions or accomplishments. In preadjudication drug courts, graduates have their criminal charges dropped and may be eligible for record expungement after remaining arrest free for an additional waiting period. Record expungement ordinarily permits the individual to respond truthfully on an employment application or similar document that he or she was not convicted of the offense (e.g., Festinger, DeMatteo, Marlowe, & Lee, 2005). In postadjudication drug courts, graduates can avoid incarceration, reduce their probation obligations, or be sentenced to time served.

In practice, drug courts tend to rely more on negative reinforcement or aversive control than on positive reinforcement for promoting behavior change (e.g., Marlowe & Wong, 2008).

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The most commonly administered reinforcers involve reductions in participants' treatment or supervisory obligations (NADCP, 1997). For example, participants may be permitted to attend treatment sessions less regularly, deliver urine specimens less frequently, or have briefer court appearances as a consequence of good performance. Social consequences such as verbal praise or applause are also meted out generously; however, material reinforcers such as gift certificates or payment vouchers are provided less often and tend to be low in magnitude (Burdon, Roll, Predergast, & Rawson, 2001; Marlowe & Kirby, 1999).

The current study examined whether outcomes in drug court would be improved by augmenting the material reinforcers that were available to participants for accomplishments in the program. Dozens of well-controlled experiments in community drug treatment programs have demonstrated that reinforcing treatment attendance or negative urine drug screens with vouchers or gift certificates can produce significant improvements in outcomes (e.g., Higgins *et al.*, 1991; Kirby, Marlowe, Festinger, Lamb, & Platt, 1998; Silverman *et al.*, 1998, 2007). Recent meta-analyses reported moderate to large effects of such interventions on abstinence from drug use (Griffith, Rowan-Szal, Roark, & Simpson, 2000; Lussier, Heil, Mongeon, Badger, & Higgins, 2006; Prendergast, Podus, Finney, Greenwell, & Roll, 2006). Moreover, evidence suggests that contingency management (CM) interventions can be equally effective with criminally involved clients who have comorbid diagnoses of antisocial personality disorder (APD; Marlowe, Kirby, Festinger, Husband, & Platt, 1997; Messina, Farabee, & Rawson, 2003; Silverman *et al.*, 1998).

It is important to note, however, that virtually all of the extant studies were conducted in traditional treatment settings in which there tended to be relatively few additional contingencies on clients' conduct. Although numerous contingencies may operate initially to bring clients into substance abuse treatment, such as

pressures from family members or warnings from probation officers, those pressures tend to be fleeting and often have little reliable force behind them (e.g., Marlowe *et al.*, 2001). Therefore, vouchers offered by the researchers may have been among the most potent and sustained contingencies operating to retain the participants in treatment. By contrast, drug courts seek to apply reliable and sustained contingencies on participants' behaviors, including punishers for infractions and both social reinforcement and reductions in supervisory obligations for achievements. Satisfactory completion of the program may result in the avoidance of a serious criminal penalty, whereas failure can lead to an immediate criminal sentence. Against such a platform of potent contingencies, the use of material reinforcers such as vouchers or gift certificates might run up against a statistical ceiling effect and fail to produce incremental benefits.

For this reason, data analyses were planned *a priori* to examine potential interaction effects by participants' risk levels. According to the criminological paradigm of the *risk principle*, augmented interventions are hypothesized to exert the greatest effects for high-risk offenders who have more severe antisocial propensities or treatment-refractory drug use histories, but they may be unnecessary for low-risk offenders (e.g., Andrews & Bonta, 1998; Taxman & Marlowe, 2006). The rationale is that low-risk offenders are less likely to be on a fixed antisocial trajectory and are apt to improve their conduct following contact with the law; therefore, due to a ceiling effect, augmented interventions may offer little incremental benefits at a substantial cost. On the other hand, high-risk offenders often require intensive and sustained interventions to change their more entrenched behavioral patterns.

Among drug offenders, the greatest risk factors for failure in traditional correctional rehabilitation programs include (a) a younger age, (b) male gender, (c) recidivist criminal history, (d) comorbid diagnosis of APD, and (e) previous failures in treatment (e.g., Gendreau,

Little, & Goggin, 1996; Marlowe, Patapis, & DeMatteo, 2003; Peters, Haas, & Murrin, 1999). Therefore, we hypothesized that participants with these risk factors would benefit most from the addition of the CM program.

A further aim was to explore alternative ways of structuring positive reinforcement for drug offenders. As noted previously, reinforcers in drug courts are typically delivered on an escalating gradient. This is in line with many studies of voucher-based CM, which have frequently used an escalating reinforcement schedule similar to the one developed and shown to be efficacious by Higgins et al. (1991). However, many drug offenders, especially those defined as high risk, are less responsive to delayed consequences. Performance on delay-discounting tasks suggests that their behavior may be strongly influenced by salient reinforcers that are large in magnitude and available relatively immediately (e.g., Fishbein, 2000; Patterson & Newman, 1993; Petry, 2002). Providing higher magnitude reinforcement for achievements early in treatment could capitalize on these characteristics to optimize outcomes. Higher magnitude reinforcement might compete more effectively against the naturally occurring contingencies that operate in clients' lives to maintain their involvement in drug abuse and crime (e.g., Kirby et al., 1998; Skinner, 1938). On the other hand, drug offenders might be more likely to make ill-advised acquisitions (e.g., items that can be readily converted to cash) if they receive high-magnitude reinforcement prior to establishing a stable interval of sobriety. The current study sought to shed light on this issue by comparing an escalating schedule of reinforcement to a nonescalating schedule that provided higher magnitude reinforcers from the outset.

METHOD

Participants

Participants ($N = 269$) were recruited from an adult felony preadjudication drug court

located in Philadelphia. To be eligible for this program, participants are required to (a) be at least 18 years of age; (b) be charged with a nonviolent felony offense; (c) have no more than two prior nonviolent convictions, juvenile adjudications, or diversionary opportunities; (d) be in need of treatment for drug abuse or dependence as assessed by a clinical case manager employed by the court; and (e) be willing to participate in the drug court program for at least 12 months. The case managers' determinations of a need for treatment did not follow standardized criteria, but were based on a clinical assessment that included the Addiction Severity Index (ASI; McLellan et al., 1992) and American Society of Addiction Medicine (ASAM, 2000) patient placement criteria.

The study participants were primarily male (80%) and most self-identified as African American (61%), Caucasian (18%), or Hispanic (24%). The mean age was 24.3 years ($SD = 7.55$), and the mean educational attainment was 11.25 years ($SD = 1.57$). Less than half (44%) were regularly employed full or part time. Virtually all were unmarried (98%), and many lived in the homes of family members or friends (61%) or in a controlled environment such as recovery housing (8%). They reported a mean annual legal income of \$7,040 ($SD = \$9,077$) with a range of \$0 to \$55,000.

At entry, participants reported currently abusing cannabis (78%), alcohol (29%), opiates (8%), cocaine or stimulants (9%), sedatives (5%), or phencyclidine (PCP) or hallucinogens (4%), and 35% reported abusing multiple substances concurrently. Because the drug use data were derived from self-report, it is possible that the use patterns were more serious than acknowledged by the participants. Nearly all participants (97%) were charged with delivery of a controlled substance or possession with the intent to deliver a controlled substance, and 28% were charged with conspiracy to commit a drug offense (participants could have multiple charges). They had a history of 1.15 ($SD =$

0.71) prior arrests. Most were represented by a public defender (84%), and the remainder were represented by private defense counsel (16%).

Recruitment Procedure

Consecutive admissions were approached at entry about their willingness to participate in the study from October, 2002, through July, 2004. The consent rate was 75% (269 of 360). To monitor potential selection bias, demographic data and criminal records were obtained on individuals who did not participate in the study. These data were received in aggregate batches from the drug court and had been purged of client-identifying information. Individuals who did not participate in the study were more likely to be male (91% vs. 80%), $\chi^2(1) = 7.76$, $p = .005$, African American (75% vs. 61%), $\chi^2(1) = 6.78$, $p = .01$, and represented by private defense counsel (22% vs. 16%), $\chi^2(1) = 3.57$, $p = .06$.

Research Design

Consenting participants were randomly assigned at entry to one of three conditions described below: (a) drug court as usual ($n = 90$), (b) drug court as usual plus an escalating schedule of material reinforcement ($n = 90$), or (c) drug court as usual plus a nonescalating schedule of material reinforcement that began at higher magnitudes and reduced the density of reinforcement over time ($n = 89$). A check on randomization confirmed that participants in the three conditions did not differ at baseline on demographic characteristics, the severity of their substance use problem, or their criminal history.

Drug court as usual. All participants in the research study were eligible for all of the services that are typically available in this drug court program. The program requires all participants to plead no contest (which has essentially the same effect as a guilty plea) to the charge, and the plea is held in abeyance pending graduation or termination. Graduates have their no-contest plea withdrawn and can have the record

expunged if they remain arrest and conviction free with no evidence of resumed drug use for an additional 12 months. If a participant fails the program, the no-contest plea is formally entered as a conviction. Given that most participants were charged with drug-dealing-related offenses, the sentence could be fairly severe, depending on the nature of the drug and the individual's prior criminal history. For example, if the drug was cocaine or heroin and the offender had no prior criminal record, according to state sentencing guidelines, the range would generally be 3 to 12 months of incarceration plus or minus 6 months at the court's discretion.

The program is scheduled for a minimum of 12 months, and most participants require approximately 14 to 16 months to satisfy requirements for graduation. Participants must advance through four phases before graduating. Phase 1 is scheduled for a minimum of 1 month and requires participants to attend an orientation, complete intake assessments, provide needed documentation (e.g., obtain photo identification), and remain drug free for 30 consecutive days. Phase 2 is scheduled for 3 months and requires compliance with treatment and maintenance of abstinence for 90 consecutive days. Phases 3 and 4 are scheduled for 4 months and require compliance with life-skills training or aftercare preparation sessions, abstinence for 120 consecutive days, and payment of fines and fees. Participants receive a certificate after completion of each phase and at graduation participate in a formal commencement ceremony in the courtroom.

Participants are required to attend status hearings in court every 4 to 6 weeks. At each hearing, the drug court team reaches a consensus about whether the participant has been compliant or noncompliant in the program and the judge, in consultation with the team, issues reinforcers, punishers, or therapeutic consequences. There is no precise specification of compliance; however, behaviors that are always

considered in this determination include attendance at scheduled appointments, provision of scheduled urine specimens, provision of drug-negative urine specimens, compliance with previously imposed sanctions, avoidance of new criminal charges, and conformity with program rules.

Reinforcers, punishers, and therapeutic consequences are administered in open court in the presence of other drug court clients, staff members, and observers. Punishers are intended to address serious or willful infractions, whereas therapeutic consequences are intended to address inadequate progress in treatment. The punishers that can be imposed are described in a manual and include verbal reprimands, a requirement to observe the court proceedings all day or all week, community service (e.g., picking up trash on a local highway), house arrest, placement in a holding cell during the court hearing, a day visit to a local jail facility to observe in-custody substance abuse treatment, planned weekend incarceration, an immediate jail sanction of 1 to 7 days, and termination from drug court and sentencing on the original plea. Therapeutic consequences may include a requirement to write or recite a 200-word essay, increased self-help sessions, or an increased modality of care (e.g., from outpatient to residential).

Participants can be referred for substance abuse treatment to over 50 licensed programs that offer detoxification, residential, intensive outpatient, outpatient, and pharmacological treatment. Housing, educational, vocational, and psychiatric services are also available when indicated. Participants are assigned to a clinical case manager who coordinates treatment referrals, submits progress reports to the judge, and appears at status hearings to provide information requested by the court. Participants provide urine specimens on a random basis at least once per week throughout their enrollment that are tested for cannabis, alcohol, opiates, amphetamines, cocaine, and PCP plus any additional substances believed to be used by the individual.

Reinforcement as usual. Participants in all three conditions were eligible for the reinforcers that are typically available in the drug court (Table 1). These are mostly structured in the form of negative reinforcement and involve reductions in treatment or supervisory obligations. Praise, applause, and group recognition are also provided, as are low-magnitude material reinforcers, including framed phase-advancement and commencement certificates, decorative candles, key chains, and baseball caps.

Enhanced escalating reinforcement. In addition to the above reinforcement, participants in the enhanced escalating condition were eligible to earn gift certificates redeemable at any store within a full-service shopping mall located a few city blocks from the courthouse. The gift certificates were distributed by research staff at the direction of the judge immediately outside the courtroom after each hearing. Participants were eligible to earn gift certificates at each of their first 12 scheduled court hearings. Because court hearings were scheduled every 4 to 6 weeks, the intervention period extended over approximately 13 months.

The gift certificates increased in value by \$5.00 increments over successive intervals of compliance (Table 1). No payment was issued if a participant was deemed to have been noncompliant; however, there was no response cost or reset, and they remained eligible for the same payment level at the following hearing. An unexcused failure to show for a court hearing resulted in no payment, and a bench warrant was issued. The total possible dollar value was \$390.00 for participants who were deemed to be compliant at each of their first 12 court hearings.

Enhanced nonescalating reinforcement. Participants in the nonescalating condition earned gift certificates redeemable at the same shopping mall. However, they earned higher magnitude gift certificates from the outset, and the density of reinforcement was steadily decreased by increasing the performance demands over time.

Table 1
Schedules of Reinforcement by Condition

No. court hearings compliant	Reinforcement as usual	Enhanced escalating reinforcement	Enhanced nonescalating reinforcement
1	Recognition in court Promotion to Phase 2 Framed certificate Decorative candle or hat Travel permission	\$5.00 gift certificate	\$30.00 gift certificate
2		\$10.00 gift certificate	\$30.00 gift certificate
3		\$15.00 gift certificate	\$30.00 gift certificate
4	Recognition in court Promotion to Phase 3 Unframed certificate Key chain Travel permission Decreased urine testing	\$20.00 gift certificate	Eligible for \$50.00 gift certificate if compliant at one additional hearing
5		\$25.00 gift certificate	\$50.00 gift certificate
6		\$30.00 gift certificate	Eligible for \$50.00 gift certificate if compliant at one additional hearing
7		\$35.00 gift certificate	\$50.00 gift certificate
8	Recognition in court Promotion to Phase 4 Unframed certificate Decreased urine testing and court hearings Travel permission	\$40.00 gift certificate	Eligible for \$75.00 gift certificate if compliant at one additional hearing
9		\$45.00 gift certificate	\$75.00 gift certificate
10		\$50.00 gift certificate	Eligible for \$125.00 gift certificate if compliant at two additional hearings
11		\$55.00 gift certificate	Eligible for \$125.00 gift certificate if compliant at one additional hearing
12	Recognition in court Graduation ceremony Commencement plaque Criminal case dismissed with prejudice Photo with judge	\$60.00 gift certificate	\$125.00 gift certificate
Total		\$390.00	\$390.00

They earned \$30.00 gift certificates at each of the first three court hearings in which they were deemed to have been compliant. Subsequently, they earned \$50.00 gift certificates after two intervals of compliance, followed by \$75.00 after two further intervals of compliance, and finally by \$125.00 after three intervals of compliance. No payment was issued for noncompliance; however, there was no response cost, and they remained eligible for the same payment at the next hearing. The total dollar value was the same as in the escalating condition (\$390.00) for participants who were deemed to have been compliant at each of their first 12 hearings.

Outcome Measures

Outcomes are reported during the first 13 months, which coincides with the first 12 scheduled court hearings and the implementation period for the intervention. The dependent variables were (a) the percentage of drug-negative urine specimens provided, (b) phase advancement in the program, and (c) the percentage of treatment sessions attended. Because participants were referred to dozens of treatment programs, the schedules for urine collection and treatment attendance varied. For instance, some programs conducted urine testing twice per week whereas others did so once per week. These practices were evenly

Table 2
Outcomes During Treatment by Condition

	Condition			<i>p</i>
	As usual	Escalating	Nonescalating	
Reinforcers received	7.59 (4.81)	13.28 (9.03)	13.04 (7.88)	.0001
Punishers received	3.21 (2.98)	3.21 (3.03)	3.39 (3.40)	.90
Value of gift certificates earned		\$122.83 (\$133.89)	\$150.39 (\$109.65)	.13
Phase advancement				.92
Phase 1	8%	16%	13%	
Phase 2	15%	6%	4%	
Phase 3	21%	22%	27%	
Phase 4	43%	37%	38%	
Graduated	13%	20%	18%	
Mean proportion drug-negative urine specimens	0.82 (0.22)	0.84 (0.21)	0.86 (0.17)	.42
Mean proportion treatment sessions attended	0.82 (0.15)	0.78 (0.20)	0.84 (0.13)	.07

Note. Data reported as means (*SD*).

distributed across the conditions and did not influence between-group differences; therefore, analyzing the data by percentages permitted a uniform metric to be used for all participants. To adjust for possible nonnormality in the dependent measures, outcome analyses were performed on log-linear transformed data as well as on raw scores. In all instances, the results were virtually the same, and therefore the raw scores are reported for ease of interpretation.

Interaction Analyses

Interaction effects were examined by age, gender, criminal history, APD diagnosis, and history of drug abuse treatment (yes or no). Although most studies have examined official arrests or convictions as an indicator of criminal history, those variables were truncated in the current study because the drug court excluded individuals with more than two prior convictions or diversionary opportunities. Therefore, we evaluated self-reported criminal activities during the 6 months preceding entry into the drug court, irrespective of whether those activities were detected by authorities or resulted in a formal charge. Criminal activity was not defined to include drug use or possession, but did include drug dealing, property offenses, theft offenses, violent offenses, and weapons offenses. A diagnosis of APD was generated from an Antisocial Personality Disorder Interview

(APDI) that was administered confidentially by trained research technicians. The ADPI is a 29-item structured interview that assesses diagnostic criteria for APD (American Psychiatric Association, 1994). In interrater reliability scoring trials, there was 90% to 100% exact agreement among our research technicians for dichotomous diagnoses of APD.

RESULTS

Program Consequences

As intended, participants in the two experimental conditions earned significantly more reinforcers than did those in the as-usual condition, $F(2, 266) = 16.80$, $p < .0001$ (Table 2). The number of reinforcers did not differ between the escalating and nonescalating conditions. Participants earned a mean of \$122.83 ($SD = \133.89) worth of gift certificates in the escalating condition and \$150.39 ($SD = \109.65) worth of gift certificates in the nonescalating condition, and this difference was not statistically significant, $F(1, 179) = 2.27$, $p = .13$. There was no difference in the number of punishers imposed across the three conditions, $F(2, 266) = 0.10$, $p = .90$.

Urine Drug Screens

Proportions of drug-negative urine samples were high across all conditions, ranging from a

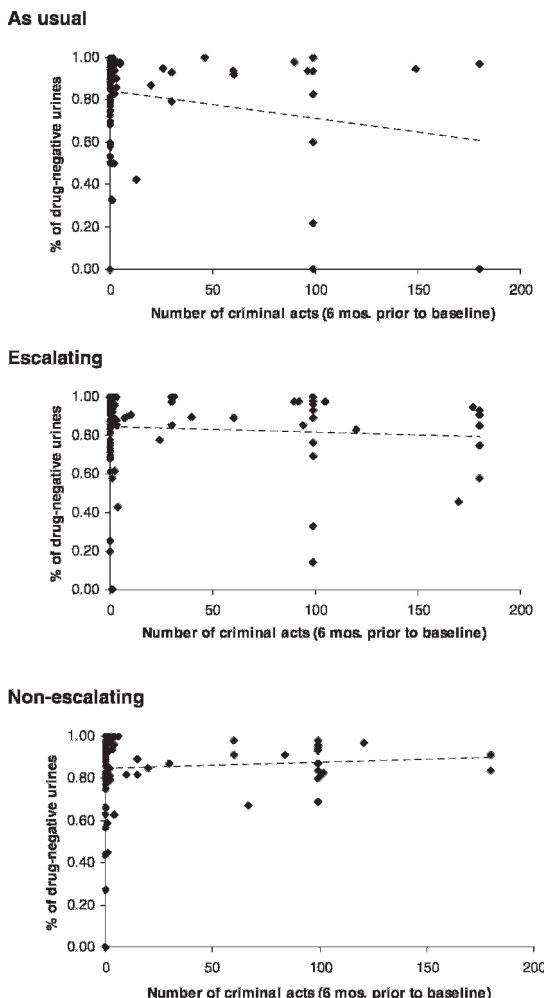


Figure 1. Interaction of condition by criminal history on drug-negative urine specimens provided during the first 13 months. Criminal history includes self-reported drug dealing, property offenses, theft offenses, violent offenses, and weapons offenses during the 6 months preceding entry into drug court, regardless of detection by authorities. Interaction effect: $p = .08$.

mean of 82% to 86%, and did not differ between conditions, $F(2, 262) = 0.88, p = .42$. A statistical trend was observed toward an interaction effect between condition and the number of criminal acts reported by participants during the 6 months preceding entry into drug court, $F(2, 256) = 2.57, p = .08$. As depicted in Figure 1, a more serious criminal

history was associated with fewer drug-negative urine samples in the as-usual condition. Specifically, rates of drug-negative urine specimens were only about 60% for individuals who reported more than 100 criminal acts prior to entry. This is commonly found in correctional studies, in which a more serious criminal history generally predicts poorer outcomes (e.g., Marlowe *et al.*, 2003). There was, however, no such effect in either of the two CM conditions in which abstinence rates remained above 80%, regardless of the severity of participants' criminal histories.

Phase Advancement

The groups did not differ in the degree to which participants advanced through the phases of the program, $\chi^2(2) = .17, p = .92$ (Table 2). Most participants advanced to Phase 3 or 4 after 13 months. Graduation rates within 13 months ranged from 13% to 20% and did not differ between conditions, $\chi^2(2) = 1.52, p = .47$.

There was a significant condition-by-age interaction effect on phase advancement, $\chi^2(2) = 6.03, p < .05$. As depicted in Figure 2, increasing age was positively related to phase advancement in the as-usual and escalating conditions. This is consistent with numerous reports from correctional studies, in which a youthful age during treatment is reliably associated with poorer outcomes, with the worst effects typically found for individuals between approximately 18 and 24 years of age (e.g., Marlowe *et al.*, 2003). There was no such relation, however, in the nonescalating condition. Phase advancement remained flat across the age ranges, leading to relatively poorer performance for participants over the age of approximately 30 years.

It is important to note, however, that caution is required in interpreting the slopes of the regression lines at the higher age ranges because most of the cases were compressed between approximately 18 and 28 years of age. There were only 17 cases (of 269) above the age of 38 years, which could have contributed to unstable

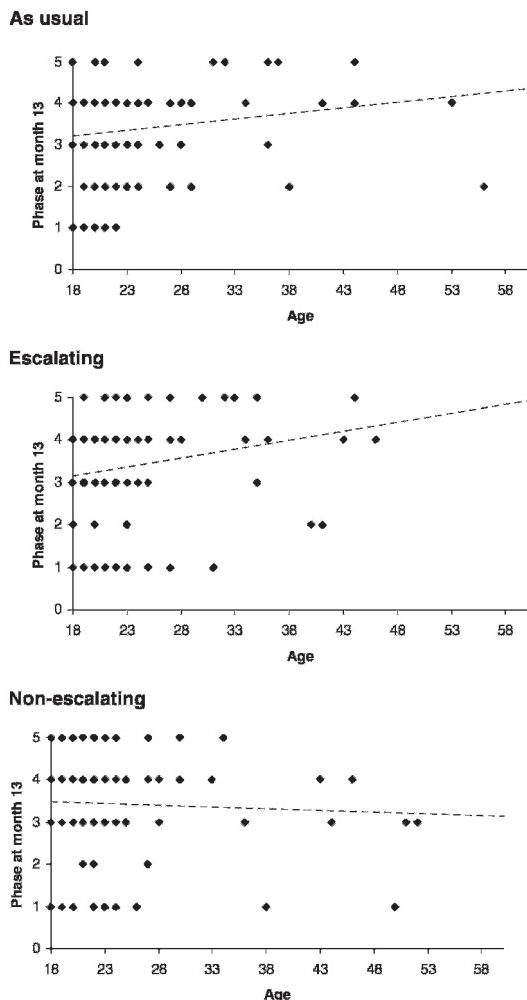


Figure 2. Interaction of condition by age on phase advancement during the first 13 months. Phase 5 = graduated. Interaction effect: $p < .05$.

regression estimates at higher age ranges. Influence diagnostics using a conventional cutoff criterion of Cook's $D > .04$ indicated that there were several overly influential data points above the age of 38 years. Deleting those cases did not correct the problem, because it reduced the number of data points to estimate the regression lines and thus contributed greater instability to the estimates. Further research involving larger numbers of older drug court participants is required to gain a better understanding of this interaction effect.

Treatment Attendance

Attendance at counseling sessions was high across all conditions, ranging from a mean of 78% to 84% and did not differ between conditions, $F(2, 263) = 2.66$. There was a statistical trend toward higher attendance in the non-escalating condition as compared to the escalating condition, $F(2, 263) = 2.66$, $p = .07$; however, the magnitude of that effect was quite small. There were no significant interaction effects on treatment attendance for any of the moderator variables that were evaluated.

DISCUSSION

Efficacy studies examine whether an intervention can be successful under ideal controlled conditions whereas effectiveness trials determine whether the intervention can remain successful if adapted to the demands of real-world environments (e.g., Howard, Moras, Brill, Martinovich, & Lutz, 1996). The efficacy of voucher-based CM has been repeatedly demonstrated in controlled experimental trials and confirmed in several recent meta-analyses (Griffith et al., 2000; Lussier et al., 2006; Prendergast et al., 2006). Unfortunately, CM interventions have generally not made their way into clinical practice; in part, because many practitioners view them (rightly or wrongly) as unduly burdensome, expensive, and potentially at odds with other procedures or philosophies of their programs (e.g., Kirby, Benishek, Dugosh, & Kerwin, 2006).

These perceived barriers may be accentuated for substance abusers involved with the criminal justice system. Judges and prosecutors are trained to adjudicate controversies and reduce recidivism and have traditionally measured their success by these metrics. Convincing these professionals of the importance of using more positive reinforcement in their work remains a serious challenge. Factor in the traditional suspiciousness of many judges and lawyers against random assignment, and conducting experimental trials of CM programs in the

courts becomes quite difficult. This may necessitate adaptations to CM interventions that are not optimal from an operant conditioning perspective but may make them more palatable and feasible for the courts.

The present study involved an effectiveness trial of a CM program delivered in the context of a felony preadjudication drug court. The odds of detecting significant effects from the CM intervention in this setting were reduced for several reasons. First, as previously described, the drug court routinely administers a substantial platform of contingencies, including punishers for infractions and social reinforcement and reductions in supervisory obligations for achievements. Ultimately, participants can avoid a serious criminal record and incarceration by complying with the program requirements. Participants are also monitored on a continuous basis for over 1 year via random weekly urine screens, monthly status hearings in court, and frequent case management appointments, and they may receive an array of clinical and adjunctive services. Detecting an effect of CM against this extensive backdrop of interventions would be difficult under ideal circumstances.

To make matters more difficult, the reinforcement schedules were of substantially lower density than those shown to be efficacious in other studies. The total magnitude of reinforcement was \$390.00 over 13 months. This is considerably lower than the schedule developed by Higgins *et al.* (1991), for example, which provided nearly \$1,000.00 over 3 months. In addition, reinforcement was delivered at 4- to 6-week intervals, which is substantially longer than the weekly, twice-weekly, or thrice-weekly assessment periods that have typically been employed. Longer delay intervals are associated with reduced efficacy (e.g., Lussier *et al.*, 2006). Finally, reinforcement was delivered contingent upon the drug court team's global appraisal of participants' compliance. Delivering reinforcement contingent on single well-defined behav-

iors, such as cocaine-free urines, is associated with greater effects (Lussier *et al.*).

Reinforcement was delivered in this manner because the current procedures are in line with typical practices in drug courts and thus may be more likely to be adopted if shown to be effective. Most drug courts deliver reinforcers and punishers on roughly a monthly basis during regularly scheduled court hearings (NADCP, 1997). Moreover, because clients in drug courts are ordinarily required to pay a few hundred dollars in legal fines or fees, it might be feasible to use those fees to support a CM program in the form of tangible rebates contingent on meeting program goals. Larger magnitude reinforcement might be less feasible in practice. Finally, drug courts are simultaneously responsible for protecting the public, maintaining the integrity of the justice system, and rehabilitating clients. As such, they tend to insist on administering reinforcers and punishers after giving concurrent attention to substance use, criminality, and responsible conduct. For example, providing a reinforcer for a drug-negative urine sample would be problematic for many drug courts if the participant had recently missed treatment appointments, lied to his or her counselor, or committed a new crime. It would, therefore, be difficult to convince many drug courts to deliver reinforcement contingent on single behaviors. Rather than attempt to convince the drug court to function otherwise, the decision was made to embed a CM program within the existing organizational climate and procedures of the court.

Perhaps for these reasons, no main effects were detected for the CM interventions in this study. Proportions of drug-negative urine specimens and counseling attendance were high across all conditions, likely contributing to a ceiling effect on these outcomes. However, two potential interaction effects were detected in preplanned analyses. There was a statistical trend ($p = .08$) suggesting that individuals with more serious criminal histories may have

provided a greater proportion of drug-negative urines when assigned to either of the two CM conditions. In the as-usual condition, more serious criminal histories were associated with lesser abstinence rates of only about 60%. This is a common finding in correctional studies, in which more serious criminal backgrounds typically predict poorer outcomes (e.g., Marlowe et al., 2003). However, this negative effect of criminality may have been attenuated by increased opportunities for material contingent reinforcement. In the CM conditions, abstinence rates remained above 80% regardless of the severity of participants' criminal backgrounds. The magnitude of this effect was not substantial, but could suggest that delivering higher magnitude reinforcement at more frequent intervals might be a useful strategy for improving outcomes among the more incorrigible drug court participants who are not predisposed to perform adequately in the program.

An interaction effect was also identified by age; however, this finding may be unreliable due to the truncated distribution of ages in the sample and several overly influential data outliers. In the as-usual and escalating conditions, a younger age was negatively associated with phase advancement, which is commonly found in studies involving criminal justice populations. There was no such relation in the nonescalating condition, in which phase advancement remained flat across the age ranges. This could suggest that the nonescalating schedule interfered with the performance of some older participants. For example, they may have become satiated more readily on the gift certificates after purchasing all or most of what they wanted from the stores in the shopping mall. Due to the potential instability of this interaction effect, however, additional research is required with larger numbers of older drug court participants to confirm the interaction. Given that no iatrogenic effect for contingent or noncontingent payment vouchers has been

reported in the literature, it is most parsimonious to assume that this finding was unreliable pending further research.

Both of these interaction effects will need to be replicated. The effects were small, one was a statistical trend, and they may have been unduly influenced by outliers. The CM procedures may, in fact, have had little or no effect on outcomes because the schedules were weak or because there was a ceiling effect from the other drug court interventions. Perhaps CM programs are more efficacious in traditional drug treatment programs because they can counteract the otherwise high likelihood of premature dropout from treatment. In drug courts, premature dropout is of lesser concern because of the substantial legal consequences that would ensue. There may be more to gain scientifically and therapeutically by studying how contingencies are naturally applied within drug court programs than by adding on new components.

On the other hand, given the inherent difficulties of detecting significant CM effects in the present study, finding any confirming evidence for the *a priori* hypotheses provides some justification for following up with additional research. Perhaps further increasing the immediacy and density of reinforcement would be sufficient to produce clinically meaningful effects. Moreover, CM programs might be more influential in programs that provide lesser services or exercise lesser aversive control over their participants, such as standard probation or pretrial diversion programs. Armed with promising evidence that CM interventions could potentially be useful for some drug offenders, it may be possible to convince correctional authorities to give them a try in their own programs.

In summary, the addition of a CM program did not improve outcomes for participants as a whole in a felony preadjudication drug court. This appears to have been attributable to a ceiling effect from the intensive services and contingencies already being delivered in the

program and possibly also to the relatively low density of reinforcement in the CM conditions. However, tentative evidence suggests incremental improvement could perhaps be achieved for certain high-risk offenders by further increasing the density of contingent material reinforcement. Additional research is needed to follow up on this potential interaction effect and to begin studying how contingencies are naturally applied within drug court programs.

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